

CLAIMS

What is claimed is:

1. A method of modifying a video signal subject to copy protection to increase picture degradation where the copy protection signal causes a reduced amplitude video signal to be recorded on the copy, comprising the steps of:

blanking a portion of the video signal at a location in the overscan portion of the video signal prior to a synchronization signal; and

adding to the blanked location a waveform for indicating a video retrace prior to occurrence of the synchronization signal.

2. The method of Claim 1, wherein the step of adding comprises adding the waveform only to portions of the video signal having active video prior to the step at blanking.

3. The method of Claim 1, wherein the step of adding comprises adding the waveform during an active video period and during at least a portion of a horizontal blanking interval of selected lines of the video signal.

4. The method of Claim 1, wherein the waveform includes a negative-going transition located in the overscan portion of the video signal.

5. The method of Claim 4, wherein the transition is at least down to the black level of the video signal.

6. The method of Claim 4 wherein the transition occurs on a plurality of consecutive lines of the video signal, defining a black rectangle in the video signal as displayed, followed by a plurality of consecutive lines

without such transitions, a plurality of such rectangles defining a pattern in one video field.

7. The method of Claim 6, further comprising the step of shifting the location of the transitions in 5 successive lines, thereby causing the checker pattern to shift vertically when viewed on a television monitor.

8. The method of Claim 7, wherein the locations of the transitions are shifted at a frequency in the range of approximately three to five times a field rate of the 10 video signal.

9. The method of Claim 6, wherein at least some lines without such transitions each have a transition from an active video level to a gray level, the transition being located prior to the horizontal synchronization 15 signal in the line.

10. The method of Claim 1, wherein the waveform is added to an overscan portion of the video signal.

11. The method of Claim 9, further comprising the steps of, in successive fields of the video signal, 20 inverting the plurality of black rectangle instead be to the transition from an active video level to a gray level, and inverting the lines having the transition from an active video level to a gray level in a prior field to instead define a black rectangle, the inversion occurring 25 at a multiple of a field rate of the video signal.

12. The method of Claim 1, wherein the synchronization signal is a vertical synchronization signal, and the waveform is of a type indicating a vertical retrace.

13. The method of Claim 1, wherein the waveform is added to at least the last two lines of active video in a field of the copy protected video signal at the lower portion of the field, the waveform being of a type for causing the television set to retrace vertically prior to recurrence of a vertical sync signal in the field.

14. The method of Claim 13, further comprising the steps of changing a position of the waveform in successive video fields.

10 15. The method of Claim 14, wherein the position of the waveform is stepped by a predetermined number of lines in each successive field.

16. The method of Claim 13, further comprising substituting the predetermined waveform for at least the first two lines of the vertical blanking interval.

17. The method of Claim 3, wherein the waveform is inserted into at least two lines located at about the end of a field of the video signal.

18. The method of Claim 1, wherein the step of blanking comprises blanking only active video.

19. The method of Claim 1, further comprising the steps of:

generating a plurality of pulses having an amplitude extending below a blanking level of the video signal; and
25 adding at least one of the plurality of generated pulses to selected active video lines of the video signal, each added pulse following the horizontal sync pulse and preceding the beginning of

an active video portion of one of the selected active video lines.

20. The method of Claim 19, wherein the selected active video lines are chosen pseudo-randomly.

- 5 21. A method of modifying a video signal subject to copy protection to increase picture degradation when a copy of the copy protected video is played, where the copy protection causes a reduced amplitude video signal to be recorded on the copy, comprising the steps of:
- 10 providing a waveform of a type for indicating a video retrace;
- substituting the waveform in at least one horizontal line of the video signal at a location prior to a synchronization signal in place of an
- 15 active video signal otherwise present at that location, wherein the location is in an overscan portion of the video signal.

22. A method of modifying a video signal subject to copy protection to increase picture degradation where the
- 20 copy protection signal causes a reduced amplitude video signal to be recorded on the copy, comprising the steps of:

- providing a waveform of a type for indicating a video retrace; and
- 25 substituting the waveform in at least one horizontal line of the video signal at a location following a synchronization signal of the video signal.

23. A method for enhancing a video copy protection
- 30 process which causes a reduced amplitude video signal to be recorded on a copy of the video signal, the method comprising the steps of:

inserting a pattern of alternating black and gray regions into an overscan portion of the active video portion of a field of the video signal; and

5 in successive fields shifting the locations of the rectangles, thereby causing a moving displacement in the displayed video signal.

24. A method of modifying a video signal subject to copy protection to increase picture degradation when a copy of the copy protected video is played, where the copy
10 protection causes a reduced amplitude video signal to be recorded on the copy, comprising the steps of:

providing a waveform of a type for causing a television set on which the copy is being viewed to retrace horizontally prior to occurrence of the
15 horizontal sync signal; and

substituting the waveform in at least one horizontal line of the video signal at a location prior to the horizontal sync signal in that line in place of an active video signal otherwise present at
20 that location.

25. An apparatus for modifying a video signal subject to copy protection, to increase picture degradation when a copy of the copy protected signal is played, where the copy protection causes a reduced
25 amplitude video signal to be recorded on the copy, comprising:

a blanker for blanking a portion of the active video of the video signal at a location prior to a synchronization signal in the overscan portion of the
30 video signal;

a pulse generator for generating a predetermined waveform; and

an adder for adding the generated waveform to the blanked portion of the video signal.

26. The apparatus of Claim 25, wherein the blanker blanks at least a portion of each of the last several lines of active video in a selected video field, and wherein the waveform is a video gray level waveform, and
5 further wherein the adder operates to add in a succession of video fields, followed by a succession of video fields that the generated waveform is not added to.

27. The apparatus of Claim 26, wherein the blanker also blanks and the generated waveform is added to at
10 least a portion of each of the first several lines of active video in the vertical blanking interval immediately following the selected video field.

28. The device of Claim 25, wherein the blanker also blanks and the generated waveform is added to at least a
15 portion of the horizontal blanking interval of predetermined lines of the video signal.

29. The apparatus of Claim 25, wherein:
the blanker blanks a portion of at least one horizontal line of the copy protected video signal at
20 a location prior to the horizontal sync signal in that line and in the overscan portion of the video signal; and
the pulse generator generates a waveform that is a negative-going transition down to at least the
25 black level of the video signal.

30. The apparatus of Claim 25, wherein the adder adds the generated waveforms into a plurality of consecutive lines of the video signal, thereby defining a black rectangle, followed by a plurality of consecutive
30 lines with a gray level waveform inserted, a plurality of such black and gray rectangles defining a checker pattern in a video field.

31. An apparatus for modifying a video signal subject to copy protection, to increase picture degradation when a copy of the protected signal is played, where the copy protection causes a reduced amplitude video signal to be recorded on the copy, comprising:

control circuitry for determining a portion of the active video of the video signal at a location prior to a synchronization signal in an overscan portion of the video signal;

a pulse generator for generating a predetermined waveform; and

a switch for switching the predetermined waveform into the determined portion of the active video.

32. A method for enhancing copy protection of a video signal having a plurality of lines in each field, there being a line synchronization pulse at the beginning of each line and a field synchronization signal at the beginning of each field, the video signal being subject to a protection process which reduces the amplitude in a copy of the video signal, comprising the steps of:

selecting at least some of the line synchronization pulses in the video signal; and

reducing a duration of the selected line

synchronization pulses, thereby causing at least one spurious field synchronization pulse when a copy is made of the video signal.

33. The method of Claim 32, wherein the step of reducing the pulse duration comprises the steps of:

generating pulses each having a duration less than that of each of the selected line synchronization pulses, the generated pulses each being of opposite amplitude value and approximately

equal absolute amplitude to the selected line synchronization pulses; and

5 adding at least one of the generated pulses into the video signal at a location of one of the selected line synchronization pulses, thereby effectively reducing a duration of each of the selected line synchronization pulses.

34. The method of Claim 32, wherein the duration, after the step of reducing, of each of the selected line
10 synchronization pulses is less than about 600 nsec.

35. The method of Claim 32, wherein the duration, after the step of reducing, of each of the selected line synchronization pulses is such that a television set sync separator filters out the line synchronization pulses and
15 does not respond to the selected line synchronization pulses.

36. The method of Claim 32, wherein the duration after the step of reducing is approximately zero.

37. The method of Claim 32, wherein the selected
20 lines begin in about the tenth line and extend to near the end of each field of the video signal.

38. The method of Claim 32, further comprising the step of adding additional line synchronization pulse into the video signal at lines near the end of each video field
25 while eliminating some of the original synchronization signals.

39. The method of Claim 32, wherein the step of reducing comprises the steps of:

generating pulses having a duration less than
30 that of each of the selected line synchronization

pulses, the generated pulses being of opposite amplitude value than the selected line synchronization pulses; and

5 adding at least one of the generated pulses into the video signal at a location of one of the selected line synchronization pulses, thereby effectively reducing a duration of each of the selected line synchronization pulses.

40. The method of Claim 32, wherein the video signal 10 includes a color burst following each line synchronization pulse, and further comprising the step of extending a duration of the color burst in each selected line.

41. The method of Claim 32, wherein the step of 15 reducing comprises replacing the line synchronization pulses with a reduced duration pulse.

42. An apparatus for narrowing line synchronization pulses in a video signal having line synchronization pulses at the beginning of each line and a field synchronization pulse at the beginning of each field, 20 comprising:

a sync separator for providing indications of line and field synchronization pulses in the video signal;

25 line selector circuitry responsive to the provided indications for selecting particular lines in each field of the video signal;

a one-shot for generating a signal of predetermined length less than that of a line synchronization pulse in response to the provided 30 indications of the line synchronization pulses; and

logic circuitry for adding the generated signals to each of the selected particular lines at a location of the line synchronization pulse in each

selected line, thereby reducing a duration of the line synchronization pulse in that line.

43. A method of defeating copy protection pulses added to a video signal, the copy protection pulses being
5 of a type to cause a video retrace at a time other than occurrence of a video synchronization signal, and being located in an active video portion of the video signal, comprising the steps of:

generating a signal having an amplitude about
10 equal to an amplitude of the synchronization signal;
and

modifying the video signal with the generated signal, wherein a deviation of the synchronization signal is thereby extended.

44. A method of defeating copy protection pulses
15 added to a video signal, the copy protection pulses being of a type to cause a video retrace at a time other than occurrence of a video synchronization signal, and being located in an active video portion of the video signal,
20 comprising the steps of:

generating a signal of a predetermined level;
and

adding the signal to the video signal at said active video portion.

45. The method of Claim 44, wherein the
25 predetermined level is at least about 20% of peak white of the video signal.

46. The method of Claim 44, wherein the
synchronization signal is a horizontal synchronization
30 signal.

47. The method of Claim 44, wherein the synchronization signal is a vertical synchronization signal.

48. A method of defeating copy protection pulses
5 added to a video signal, the copy protection pulses being
of a type to cause a video retrace at a time other than
occurrence of a video synchronization signal, and being
located in an active video portion of the video signal
comprising the steps of:
10 generating a signal of a predetermined level;
and
replacing the copy protection pulses with the
generated signal.

49. The method of Claim 48, wherein the
15 predetermined level is at least about 20% of peak white of
the video signal.

50. The method of Claim 48, wherein the
synchronization signal is a horizontal synchronization
signal.

51. The method of Claim 50, wherein the
20 synchronization signal is a vertical synchronization
signal.

52. A method of defeating a video copy protection
scheme that reduces a duration of line synchronization
25 pulses, thereby causing a spurious field synchronization
pulse in the video signal when a recording is made
thereof, comprising:
determining a location of at least some of the
line synchronization pulses having reduced duration;
30 and

modifying the line synchronization pulses to be of a longer duration.

53. The method of Claim 52, wherein the longer duration is less than a duration of a standard line synchronization pulse.

54. The method of Claim 52, wherein the step of modifying comprises:

generating a line synchronization pulse;
blanking the reduced duration line
10 synchronization pulse; and
inserting the generated line synchronization pulse in place of the blanked line synchronization pulse.

55. The method of Claim 54, wherein the generated
15 line synchronization pulses are of a duration to extend into an adjacent active video portion of the line.

56. An apparatus for defeat of anticopy pulses present in active video portions of a video signal, the anticopy pulses being located at the end of at least some
20 video fields and at the end of at least some video lines in the active video portions thereof, comprising:

a sync level restoration circuit for restoring the horizontal sync pulse tips of the video signal to a predetermined level;
25 circuitry for generating control signals of a first predetermined duration at the end of at least some lines of the video signal and of a second predetermined duration at the end of at least some fields of the video signal; and
30 switch circuitry controlled by the control pulses for switching a particular signal level into

the restored video signal, thereby permitting an acceptable recording to be made thereof.

57. The apparatus of Claim 56, wherein the particular signal level is at least 20% of a peak white level of the restored video signal.

58. An apparatus for defeat of anticopy pulses added to the active video portions of a video signal prior to synchronization pulses, comprising:

logic circuitry for generating control signals
10 of predetermined duration during the active video portions; and

circuitry actuated by the control pulses for combining a predetermined signal into the active video portion, thereby permitting an acceptable
15 recording to be made of the video signal.

59. The apparatus of Claim 58, wherein the logic circuitry generates the control signals at times just prior to the occurrence of the horizontal and vertical blanking intervals of the video signal.

20 60. The apparatus of Claim 59, wherein the predetermined signal is at least 20% of a peak white level of the video signal.

61. The apparatus of Claim 59, further comprising a restoration circuit for restoring the video signal to a
25 predetermined horizontal sync pulse tip level, the restored video signal being provided to the circuitry actuated by the control pulses.

62. The apparatus of Claim 58, wherein the circuitry actuated by the control pulses includes at least one
30 switch circuit.

63. The apparatus of Claim 59, wherein the circuitry actuated by the control pulses includes a level shifting pulse signal generator.

64. The apparatus of Claim 59, wherein circuitry
5 actuated by the control pulses replaces the active video
portions for the predetermined duration with the
predetermined signal.

65. The apparatus of Claim 58, wherein the circuitry actuated by the control pulses further generated horizontal blanking interval pulses and replaces a horizontal blanking interval following at least one of the active video portions with the generated horizontal blanking interval pulses.

66. The apparatus of Claim 58, wherein the circuitry
15 actuated by the control pulses includes:

at least one multipole switch for combining the predetermined signal, wherein the multipole switch in one position passes a source video signal unchanged, and in a second position switches in the predetermined signal and switches out the source video signal.

67. An apparatus for defeat of an anticopy modification to a video signal, the anticopy modification including reducing a duration of at least some of the horizontal synchronization pulses in the video signal so as to be less than a standard duration, the apparatus comprising:

logic circuitry for determining a location of
the horizontal blanking interval in at least certain
30 lines of the video signal and generating a control
signal in response;

a pulse generator for generating a horizontal
synchronization pulse of predetermined duration; and
switch circuitry for adding the generated
horizontal synchronization pulse to the video signal,
5 the switch circuitry so adding in response to the
control signal.

68. The apparatus of Claim 67, wherein the generated
horizontal synchronization pulse is of lesser duration
than the standard duration.

10 69. The apparatus of Claim 67, wherein the pulse
generator also generates a color burst signal, and the
switch circuitry adds the generated color burst signal to
the video signal.

70. An apparatus for defeat by level shifting of
15 anticopy pulses present in the active video portions of a
video signal, the anticopy pulses being located at the end
of at least some video lines in the active portion
thereof, comprising:

a timing circuit for generating a control signal
20 at a start of the anticopy pulses at the end of at
least some video lines;

a pulse generator for generating a pulse having
a particular level above a blanking level of the
video signal at the end of each video line, in
25 response to the control signal; and

means for adding the generated pulse to the
video signal, thereby increasing a level of the end
of each video line.

71. The apparatus of Claim 70, further comprising:
30 a second timing circuit for generating a second
control signal at the end of each video field;

a second pulse generator for generating a second pulse having a particular level above a blanking level of the video signal in response to the second control signal; and

5 means for adding the generated second pulse to the video signal, thereby increasing a level of the end of each video field.

72. The apparatus of Claim 70, further comprising:

10 a generator for generating a horizontal sync pulse having a longer duration than a horizontal sync pulse otherwise present in the video signal; and

a switch for replacing the horizontal sync pulses otherwise present in the video signal with the generated horizontal sync pulses.

15 73. The apparatus of Claim 70, wherein the pulse generator includes a voltage controlled amplifier for multiplying a signal level of the video signal by a particular value.

74. A method of defeating copy protection pulses
20 added to a video signal, the copy protection pulses being of a type to cause a video retrace other than at occurrence of a video synchronization signal, and being located in an active video portion of the video signal, comprising the steps of:

25 determining a location of the video synchronization signal;

generating a pulse of an amplitude approximately that of the video synchronization signal; and

30 adding the generated pulse to the video signal immediately prior to occurrence of the video synchronization signal.

75. The method of Claim 74, wherein the video synchronization signal is a horizontal sync signal.

76. The method of Claim 74, wherein the video synchronization signal is a vertical sync signal.

5 77. The method of Claim 74, wherein the added pulse in combination with the vertical sync signal is a serrated waveform.

78. The method of Claim 75, further comprising the step of adding a color burst to the extended duration
10 video synchronization signal.

79. A method of defeating a video copy protection process, the process being of a type to cause a video retrace at a time other than occurrence of a video synchronization signal in a video signal and being located
15 in an active video portion of the video signal, and also including added pulses extending below a blanking level of the video signal, the added pulses being located in selected horizontal video lines of the video signal between the horizontal sync pulse and about at the
20 beginning of active video in each video line, the method comprising the steps of:

generating a control signal at locations of the added pulses; and
attenuating the added pulses in response to the
25 control signals.

80. The method of Claim 79, wherein the step of attenuating includes blanking the added pulses.

81. The method of Claim 79, wherein the step of attenuating includes reducing a duration of the added
30 pulses.

82. The method of Claim 79, wherein the step of attenuating includes increasing a level of the added pulses relative to the blanking level.

83. The method of Claim 79, wherein the step of
5 attenuating includes reducing an amplitude of the added pulses.

84. The method of Claim 79, wherein the step of attenuating includes fixing the location of each of the added pulses relative to the horizontal sync pulse in each
10 horizontal video line.

85. The method of Claim 79, wherein the step of attenuating includes the steps of:
generating a high frequency signal; and
adding the generated high frequency signal to
15 the video signal.

86. A method of defeating a copy protection process that adds pulses to a video signal, the method comprising the steps of:
reducing an amplitude of at least a portion of
20 an active video part of the video signal; and
increasing an amplitude of a synchronization pulse of the video signal.

87. An apparatus for defeating a video copy protection process, the process being of a type to cause a
25 video retrace at a time other than occurrence of a video synchronization signal in a video signal and being located in an active video portion of the video signal, and also including added pulses extending below a blanking level of the video signal, the added pulses being located in
30 selected horizontal video lines of the video signal between the horizontal sync pulse and the beginning of

active video in each horizontal video line, the apparatus comprising:

logic circuitry for generating control signals at locations of the added pulses; and

5 an attenuator for attenuating the added pulses in response to the control signals.

88. The apparatus of Claim 87, wherein the attenuator includes a blanker for blanking the added pulses.

10 89. The apparatus of Claim 87, wherein the attenuator reduces a duration of the added pulses.

90. The apparatus of Claim 87, wherein the attenuator increases a level of the added pulses relative to the blanking level.

15 91. The apparatus of Claim 87, wherein the attenuator reduces an amplitude of the added pulses.

92. The apparatus of Claim 87, wherein the attenuator fixes the location of each of the added pulses relative to the horizontal sync pulse in each line.

20 93. A method of defeating the effects of a video anti-copy process that adds pulses to blanking intervals of a video signal, comprising replacing a back porch portion of the video signal having an amplitude at blanking level with a signal having an amplitude below the
25 blanking level.

94. The method of Claim 93, wherein the amplitude below the blanking level is about -20 IRE units.

95. The method of Claim 93, further comprising the steps of:

generating a plurality of negative-going pulses;
and

5 adding the plurality of negative-going pulses to about the last ten active lines of at least some fields of the video signal.

96. The method of claim 95, further comprising the step of modifying a portion of the video signal following
10 each added negative-going pulse to be at a blanking level of the video signal for a predetermined period.

97. The method of Claim 93, wherein the step of replacing includes adding a negative level shifting pulse to the back porch portion of the video signal.

15 98. A method of defeating a video copy protection process that adds paired negative and positive going pulses to blanking intervals of a video signal, the method thereby enabling recording a viewable copy of the video signal, comprising the steps of:

20 determining a particular portion of at least some video lines of the video signal, the added pulses being present in the particular portion; and
reducing a level of the particular portion to below a blanking level of the video signal.

25 99. The method of Claim 98, wherein the particular portion includes a backporch of each of the video lines.

100. The method of Claim 98, wherein the level is lower than about -20 IRE units.

101. The method of Claim 98, further comprising the
30 steps of:

determining a portion of each field of the video signal containing none of the added pulses;

generating a plurality of negative-going pulses;

generating a plurality of positive-going pulses

5 having a level of about -10 to -30 IRE; and

adding the plurality of the generated negative-going and positive-going pulses to the determined portion of each field.

102. An apparatus for defeat of an anti-copy process
10 that adds paired negative-going and positive-going pulses to blanking intervals of a video signal, comprising:

means for determining a back porch portion of the video signal, the back porch having an amplitude of a blanking level of the video signal; and

15 means for replacing the back porch portion with a signal having an amplitude below the blanking level.

103. The apparatus of Claim 102, further comprising:

a generator for generating a plurality of
20 negative-going pulses; and

means for adding the plurality of negative-going pulses to about the last ten lines of at least some fields of the video signal.

104. An apparatus for defeat of a video copy
25 protection process that adds pulses to blanking intervals of a video signal, comprising:

a generator for generating a signal below a blanking level of the video signal;

30 timing circuitry for determining durations of particular portions of at least some lines of the video signal, the added pulses being present in the particular portions; and

- 88 -

an adding circuit for adding the generated signal to the video signals at the determined duration.

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